



# Case Study

## Co-processing Waste Materials in Cement Production

### Selection of Adequate Feed Points

#### The Example of Lägerdorf, Holcim Germany

##### BACKGROUND

In the 1980's and early 1990's co-processing of waste in cement plants was not common in Germany. As one of the first plants, Holcim Germany's Lägerdorf plant started with waste oil and selected industrial waste such as diatomaceous earth and paper sludges. In 2004, the plant was co-processing a total volume of 118,000 t of alternative fuels, and 228,000 t of alternative raw materials.

##### PROCESS

The Lägerdorf plant was originally equipped with two grate preheater ("Lepol") kilns. As from 1995, kiln No.11 was put into operation. This is an SP kiln with precalciner and flash dryer for the raw material that is prepared in a wet process. This kiln was especially designed for the use of AFR. A large variety of AFR with completely different material characteristics requires different feed points to be selected in the kiln system (see figure below). In Lägerdorf, examples for all types of feed points can be found.

##### FEED POINT SELECTION

Sludges from the treatment of drinking water are even less polluted than the virgin raw material. Hence they can be fed without further testing, together with the natural raw materials. Fly ash from coal-fired power plants contain residues of unburned carbon and traces of mercury. In this case a comprehensive emission assessment (including an "expulsion test" by HGRS)

was carried out. It showed that feeding via the flash dryer does not cause any additional emissions, neither of organic nor of metallic origin. This was confirmed by several measurements of the stack emissions.

All other AFRs are fed directly to the "hot" part of the process where organic components would not just evaporate but be burnt completely.

**Examples:** Organic distillation residues from the chemical industry are considered "hazardous wastes" due to their chemical characteristics. In the calciner they are completely burned with full recovery of their considerable calorific value. Animal meal – a "high risk material" that is a perfect substitute for brown coal due to its similar calorific value and burning behavior – is also fed to the precalciner firing, the same as fuller's earth – a soil-type residue from the food and lubrication oil industry.

The treatment of salt slags – a residue from the aluminum smelting process – provides a fine grained aluminum oxide very similar to natural clay. It is fed into the calciner as an alternative raw material where its ammonia content even contributes to the reduction of  $\text{NO}_x$  from the main flame.

Other alternative fuels such as waste oil, solvents or "fluff" – the combustible fraction of sorted municipal waste – are fed directly to the main burner of the kiln system.





Slurry storage tanks



Storage and dosing for waste

### GOOD PRACTICE

Prior to co-processing AFR, all candidate wastes are subject to a sophisticated preassessment procedure, consisting of:

- a pre-screening step to check compliance with internal and external requirements
- a process check to ensure compatibility with the cement kiln operations
- a plant trial with a limited quantity of waste.

All necessary measures must be taken to protect health and safety of workers and nearby residents.

### FURTHER DEVELOPMENT

Recently the series of alternative fuels and raw materials was extended by fluffy foil and paper from municipal and commercial waste, and by shredded roof felt.

Occasionally services are rendered at the request of authorities, for example the co-processing of animal meal, or rotten or contami-

nated feed stuff. The incineration of confiscated cigarettes, drugs, counterfeit money or even outdated banknotes has been requested in the past. These projects are typically not attractive in most cases due to the very demanding control measures, and were finally accomplished by commercial waste incinerators available in the region.

### LESSONS LEARNT

An early decision to build up a pre-processing platform would have been acceptable from today's point of view. As the situation was less favorable for such a decision then, the intensive cooperation with an external platform was the best compromise and is still well maintained. However, waste streams and waste handling can be controlled more easily and more efficiently in a wholly owned pre-processing plant.

### REFERENCES

- [www.coprochem.com](http://www.coprochem.com)
- [www.holcim.com/de](http://www.holcim.com/de)

